Spot Safety Project Evaluation

Project Log # 200512150

Spot Safety Project # 04-95-282

Spot Safety Project Evaluation of the Traffic Signal Installation at NC 42 and SR 1525 in Johnston County

Documents Prepared By:

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_____ 11/21/06
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Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-95-282 - Traffic Signal Installation at NC 42 and SR 1525 in Johnston County.

Project Information and Background from the Project File Folder

NC 42 was a two-lane, 55 mph facility, without left turn lanes at the intersection with SR 1525. SR 1525 was a two-lane, 55 mph facility, without left turn lanes, and a stop condition at the intersection with NC 42. From 2/1/95 to 1/31/98 there were a total of 18 crashes, 3 Left Turn, 9 Angle, 4 Rear End, and 2 random type crashes. The crashes resulted in 1 Class A, 6 Class B, and 14 Class C injuries. Of these 18 crashes there were two that involved school buses.

There was a lack of adequate gaps for traffic to cross or access NC 42 during peak periods. NC 42 has a vertical crest at the intersection with SR 1525 that may have caused sight distance issues. This situation resulted in a crash problem at the intersection. The improvement chosen for the subject location was to install a fully actuated traffic signal. The final completion date for the improvement at the subject location was on September 21, 1998 at a cost of $45,000.

Please note turn lanes were also installed at this location, along with a speed reduction from 55 mph to 45 mph on the north leg of SR 1525. The speed reduction was effective on 10/26/2001. There were no sketches or diagrams in the project folder showing the added turn lanes. Using the police reports as reference, the turn lanes are estimated to be installed during the year 2001. These changes were not a part of, nor funded by, the spot safety project.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes along the subject road, the crash data omitted from this analysis to consider for an adequate construction period was from August 1998 to October 1998. The before period consisted of reported crashes from December 1, 1990 through July 31, 1998 (7 years, 8 Months) and the after period consisted of reported crashes from November 1, 1998 through June 30, 2006 (7 Years, 8 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject location. The following data table depicts the Naive Before and After Analysis for the above information. Please note that Frontal Impact and Rear End crash types were the target crashes for the applied countermeasure. These crash types considered are as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On, Angle; Rear End, slow or stop; and Rear End, turn.

Treatment Information			
	Before	**After***	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	27	48	77.8
Total Severity Index	7.9	5.8	-26.6
Frontal Impact Crashes	18	15	-16.7
Frontal Severity Index	9.7	10.0	2.8
Rear End Crashes	8	30	275.0
Rear End Severity Index	4.7	3.7	-21.0
Volume	5500	16950	208.2
Treatment Injury Crashes			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Fatal	0	0	N/A
Class A	1	1	0.0
Class B	5	9	80.0
Class C	10	12	20.0
Property Damage Only	11	26	136.4
Frontal Injury Crashes			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Fatal	0	0	N/A
Class A	1	1	0.0
Class B	5	6	20.0
Class C	6	2	-66.7
Property Damage Only	6	6	0.0
Rear End Injury Crashes			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Fatal	0	0	N/A
Class A	0	0	N/A
Class B	0	2	N/A
Class C	4	10	150.0
Property Damage Only	4	18	350.0

Table 1.

The naive before and after analysis at the treatment location resulted in a 78 percent increase in Total Crashes, a 17 percent decrease in Frontal Impact Crashes, a 275 percent increase in Rear End Crashes and a 208 percent increase in Average Daily Traffic (ADT). The before period ADT year was 1994 and the after period ADT year was 2002.

*See next page for a breakdown of After Period crash data.

	After*		
	Signal 11/98 - 8/01	Signal and Turn Lanes 10/01 – 6/06	Total
Total Crashes	11	37	48
Total Severity Index	4.4	6.2	5.8
Frontal Impact Crashes	4	11	15
Frontal Severity Index	4.7	11.9	10.0
Rear End Crashes	7	23	30
Rear End Severity Index	4.2	3.6	3.7

Table 2.

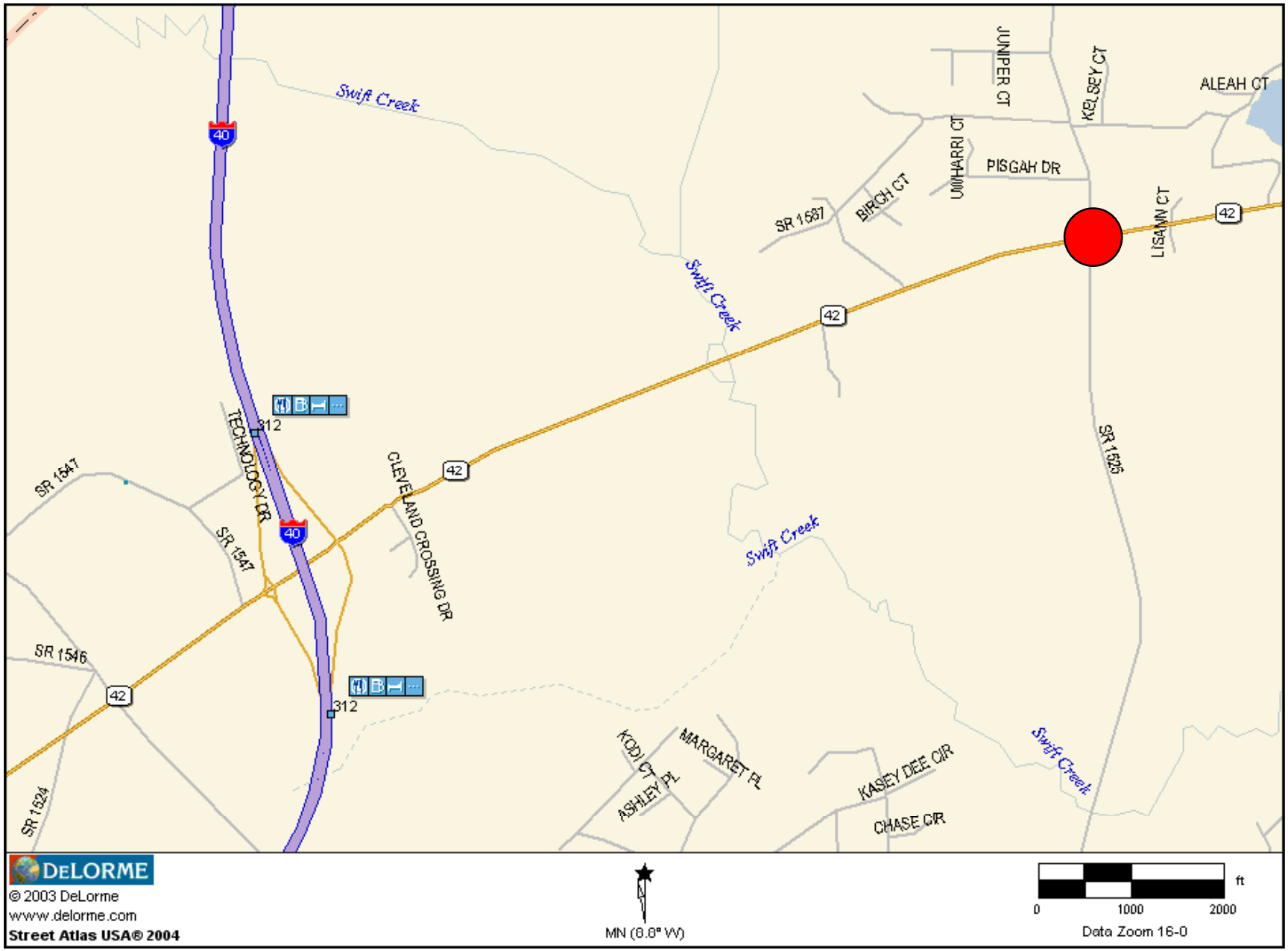
Using the crash reports as a reference, the turn lanes were added sometime during September 2001. The data was separated by the information illustrated in the reports to show crashes before and after the turn lanes were installed. (Table 2)

Results and Discussion

The naïve before and after analysis involving the comparison of treatment before data versus treatment after data resulted in a 78 percent increase in Total Crashes and a 17 percent decrease in Frontal Impact Crashes. The summary results above demonstrate that the treatment location appears to have had an increase in the number of Total Crashes and a decrease in the number of Frontal Impact Crashes from the before to the after period.

During the site visit a crest vertical curve was noted at the subject intersection. The steepest approach is the west leg of NC 42 at +3% toward the intersection. The east leg of NC 42 also has a decreasing slope (-2%) away from the intersection. Referencing the After Period collision diagram, the impact of the vertical crest curve can be seen by the pattern of rear end crashes. The vertical crest along with the significant increase in ADT may still be areas of concern at this intersection.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of road.



Location Map: Johnston County, NC 42 at SR 1525

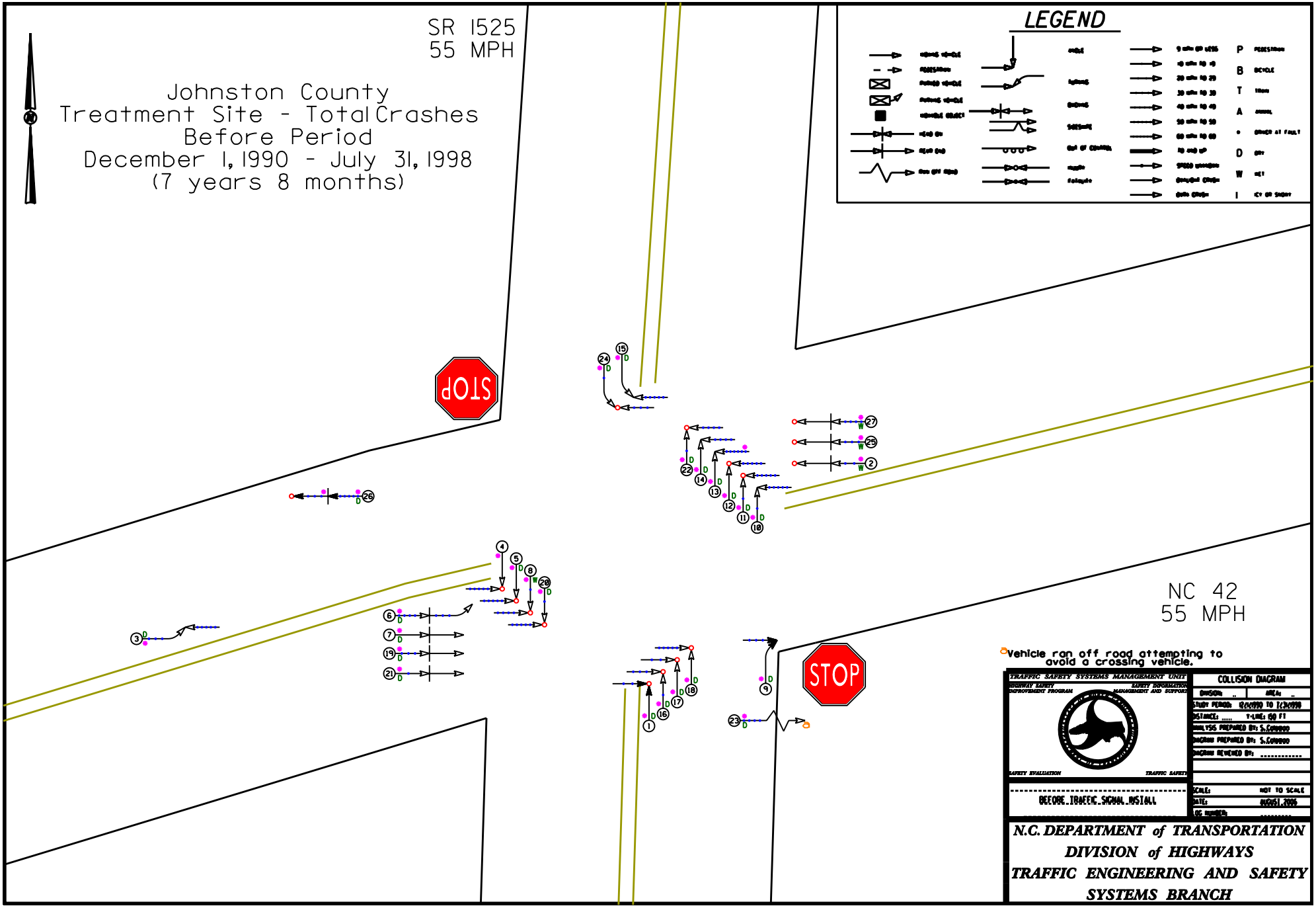
Treatment Site Photos Taken October 6, 2006

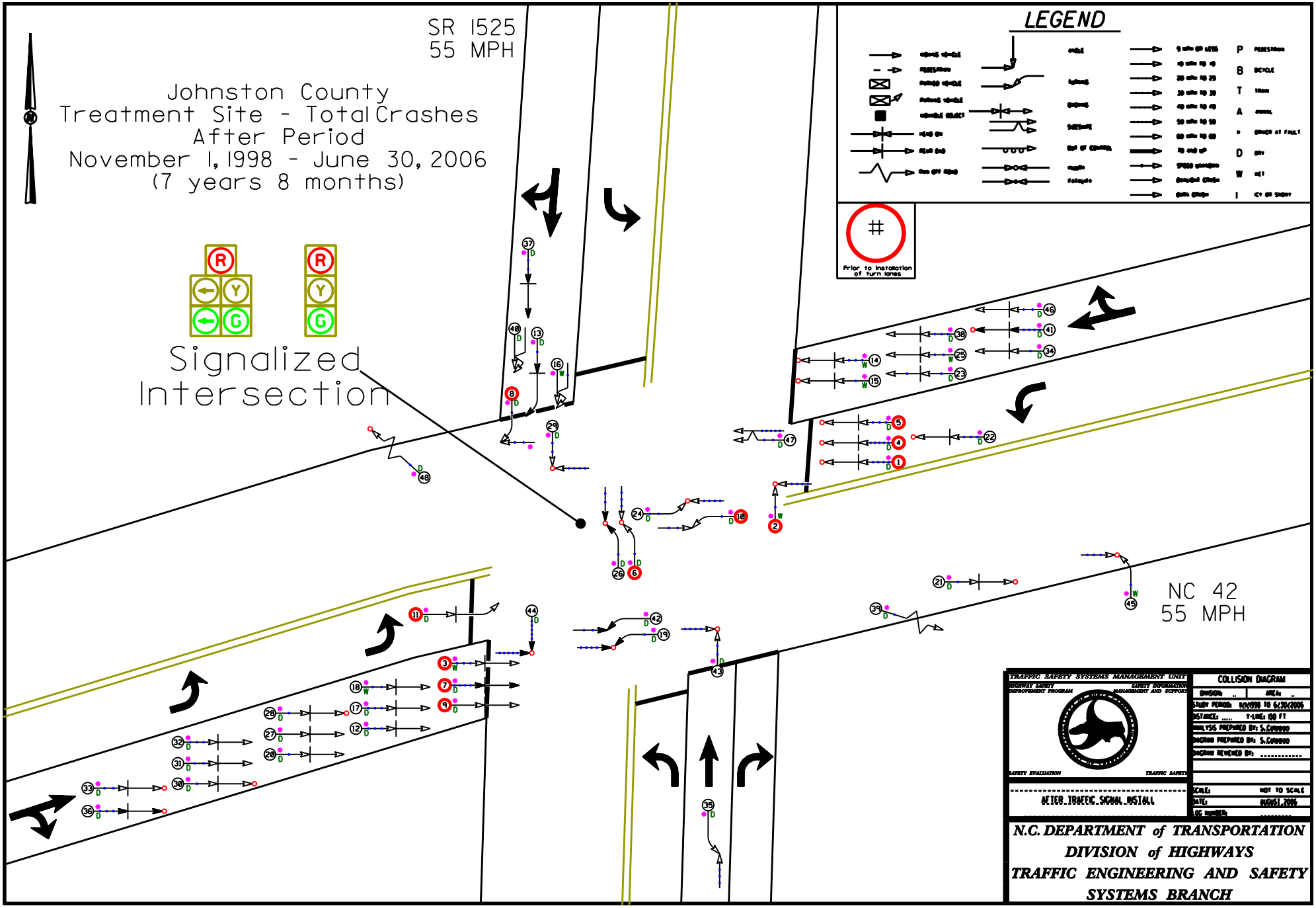
On NC 42 facing west.

On SR 1525 facing north.

On SR 1525 facing south.

On NC 42 facing west


SR 1525
55 MPH
Johnston County
Treatment Site - Total Crashes
Before Period
December 1, 1990 - July 31, 1998
(7 years 8 months)
LEGEND
STOP
STOP
NC 42
55 MPH
Vehicle ran off road attempting to avoid a crossing vehicle.
COLLISION DIAGRAM
BEFORE TRAFFIC SIGNAL INSTALL
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH


SR 1525
55 MPH
Johnston County
Treatment Site - Total Crashes
After Period
November 1, 1998 - June 30, 2006
(7 years 8 months)
Signalized Intersection
LEGEND
Prior to installation of turn lanes
NC 42
55 MPH
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT
COLLISION DIAGRAM
AETER_TRAFFIC_SIGNAL_INSTALL
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH